"The Forests of Oregon" (Bull. I., Oregon State Board of Forestry, 1911), by Professor G. W. Peavy, and the "First Annual Report of the State Forester" of Oregon (1912), by F. A. Elliott, indicate the state of mind of the people of the northwest in regard to the conservation of their forests.

One of the best of recent publications on trees is "New England Trees in Winter," by Professors Blakeslee and Jarvis, of the Storrs Agricultural Experiment Station (Bull. 69, 1911). After a helpful introduction, by means of keys the student is led to the principal genera, where further keys lead him to the species, and last to full descriptions accompanied by excellently selected photographs (in "half tone"). We do not recall any better treatment of our trees than is to be found in this publication, nor anything approaching it in other station bulletins. The authors are to be congratulated upon the quality of the matter which they have presented, and the Station upon its wisdom in giving it publication.

Here may well be mentioned favorably E. R. Jackson's "Forestry in Nature Study" (U. S. Dept. Agric. Farmers' Bulletin, 468), which should be found in every public school in the country. Mr. Lamb's "Key to Common Kinds of Trees" (p. 38) should prove helpful to many teachers who have somewhat hazy ideas as to the identity of the trees about them.

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SPECIAL ARTICLES

THE ACCUMULATION OF OIL AND GAS IN SANDSTONE

Let two plates of glass be slightly inclined to each other and touching along one edge. Place by means of a pipette some petroleum and water between the plates. By manipulation of the plates, cause a bubble of air and oil to be enclosed within the water. It will be noticed that while the oil surrounds the air, much more than half of the oil will lie toward the thinner end of the combined bubble. This would, of course, naturally follow, since liquids are subject to capillarity and gases not.

Let us now consider the newly formed strata of marine or lagoon shales and sandstones, which are potentially petroliferous. All the interstices will at first be filled with water. Assuming now that the petroleum and natural gas arise from chemical changes in included organic substances, principally in the shale, we have the following sequence of events. The gas that originates finds itself forced by the greater hold that the water has for the fine interstices to take a position in the largest near interstice. If this is more globular than tubular or flat, a bubble of gas will be thus imprisoned, otherwise it will move along till it reaches the largest lacuna. In other words, much of the gas will leave finer grained rocks for the coarser, and so produce an accumulation of gas in sandstone reservoirs. Gas then is the first constituent to be forced into these reservoirs.

But further, although petroleum has a lower capillarity constant, it has an extraordinary capacity of spreading along a surface between water and a gas. This is shown by the way oil will surround a bubble of air in water between two plates of glass. Therefore, in the movement of the gas bubble from the place of origin to the reservoir, each will carry with it a pellicle of oil, and thus accomplish an accompanying movement of oil from the place of origin to the reservoir.

I regret that I have not the facilities to demonstrate experimentally these principles, since they would be easily put to the test, given the required apparatus.

As to their practical bearings,

(*a*) Since the shale can contribute to a neighboring sandstone reservoir, contiguous bodies of organic shale and limestones would be considered favorable circumstances, rather than negligible as held by I. C. White, who finds the origin of the oil and gas within the sandstone.

(*b*) A reservoir may be expected to receive its oil and gas from shale above as well as below.

(*c*) A sandstone embedded within shales that seem to have very little oil in them may

yet have derived its oil from them in the past. The oil has been largely moved away as formed. Hence, richly petroliferous shales are not a necessary indication in oil prospecting.

(*d*) Gravitational sorting requires not only a certain necessary degree of dip, but also a necessary degree of porosity, because in interstices below a certain size, surface tension checks the motion necessary for gravitational sorting. For this reason, water-filled shales or very fine-grained sandstones or limestones lying above porous rocks, act as impervious barriers, instead of allowing the oil and gas to reach the surface.

(*e*) While gas can move in a water-saturated rock with a lower degree of dip or with a lower porosity than oil, yet, since the gas bubble carries with it a pellicle of oil, a certain quantity of oil can be carried where it would not otherwise move.

(*f*) Inasmuch as all porous reservoirs in the strata constituting our oil fields were originally water-filled, dry porous sands really contain gas. It is not recognized because not under sufficient pressure to escape noticeably. This gas has been contributed to it generally by neighboring strata, and may have served for the transport of oil. As gas becomes more expensive, this gas may be extracted by suction, as is already done in gas-sands which have lost their pressure.

Of course, the principles here proposed are not exclusive of the action of gravitation and moving water, but act in conjunction therewith.

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THE AMERICAN SOCIETY OF ZOOLOGISTS

THE Eastern and Central Branches of the American Society of Zoologists met in joint session at Princeton University, Princeton, N. J., December 27 and 29, 1911, in conjunction with the American Society of Naturalists and the American Association of Anatomists.

The following officers of the Eastern Branch for the ensuing year were elected:

President—A. G. Mayer, Carnegie Institution of Washington, D. C.

Vice-president—G. A. Drew, Marine Biological Laboratory, Woods Hole, Mass.

Secretary-treasurer—John H. Gerould, Dartmouth College, Hanover, N. H.

Additional Member of the Executive Committee—H. E. Jordan, University of Virginia.

These officers, in addition to David H. Tennent and Ross G. Harrison, will constitute the executive committee of the Eastern Branch. It is understood that the same officers of the Central Branch that served last year will continue in office.

The following persons were elected members of the American Society of Zoologists:

Central Branch—J. Frank Daniel, University of California; T. W. Galloway, James Milliken University; Wilhelmine Enteman Key, Lombard College; George R. La Rue, University of Michigan; Joseph A. Long, University of California; Marian L. Shorey, Milwaukee-Downer College; Aaron F. Shull, University of Michigan; Leroy D. Swingle, Nebraska Wesleyan University.

Eastern Branch—Thomas Barbour, Harvard University; M. T. Burrows, Cornell University Medical College; H. S. Colton, University of Pennsylvania; E. D. Congdon, Cornell University Medical College; Henry Fox, Ursinus College; Leland Griggs, Dartmouth College; Mary J. Hogue, Mt. Holyoke College; M. H. Jacobs, University of Pennsylvania; H. G. Kribs, University of Pennsylvania; C. V. Morrill, New York University and Bellevue Hospital Medical College; H. D. Reed, Cornell University; A. H. Wright, Cornell University.

The following committee was appointed to consider during the ensuing year the problem of the organization of the society, and to prepare a new constitution: H. V. Wilson, chairman; E. G. Conklin, G. A. Drew and R. G. Harrison (Eastern Branch); F. R. Lillie, W. A. Locy and M. M. Metcalf (Central Branch).

The following papers were presented at the meeting, either in full or by title:

The Sense of Smell in Necturus maculatus: R. E. SHELDON, University of Pittsburgh.

Conjugation and its Significance in the Ciliate, Didinium: S. O. MAST, Johns Hopkins University.

Didinia about to conjugate decrease nearly three fourths in size, and the anterior ends become considerably flattened. They find each other by random movements, join anterior end to anterior end and remain together from four to twelve hours or longer, depending largely upon the tem-